

# Chapter 10

## Braking system

### Contents

Anti-lock braking system (ABS) – general information . . . . .	15	General information and precautions . . . . .	1
Anti-lock braking system components – removal and refitting . . . . .	16	Hydraulic pipes and hoses – renewal . . . . .	3
Brake control valve/compensator – removal, overhaul and refitting . . . . .	9	Parking brake – adjustment . . . . .	11
Brake discs – inspection, removal and refitting . . . . .	6	Parking brake cables – removal and refitting . . . . .	12
Brake hydraulic system – bleeding . . . . .	2	Parking brake 'on' warning light switch – removal and refitting . . . . .	14
Brake pedal – adjustment . . . . .	10	Rear brake caliper – removal, overhaul and refitting . . . . .	8
Front and rear brake pad and disc check . . . . .	See Chapter 1A or 1B	Rear brake pads – renewal . . . . .	5
Front brake caliper – removal, overhaul and refitting . . . . .	7	Stop light switch – removal and refitting . . . . .	13
Front brake pads – renewal . . . . .	4		

### Degrees of difficulty

**Easy**, suitable for novice with little experience



**Fairly easy**, suitable for beginner with some experience



**Fairly difficult**, suitable for competent DIY mechanic



**Difficult**, suitable for experienced DIY mechanic



**Very difficult**, suitable for expert DIY or professional



### Specifications

#### General

System type . . . . .	Dual hydraulic circuit, front-rear split. Anti-lock braking system available on some models. Front and rear disc brakes fitted to all models. Hydraulic pressure provided by main hydraulic system (see Chapter 9). Cable-operated parking brake operating on front wheels.
-----------------------	---

#### Front brakes

Type . . . . .	Disc with single piston sliding caliper
Disc diameter:	
Models up to February 1991 . . . . .	276.0 mm
Models from March 1991 . . . . .	283.0 mm
Disc thickness:	
New:	
Models up to February 1991 . . . . .	22.0 mm
Models from March 1991 . . . . .	26.0 mm
Minimum thickness:	
Models up to February 1991 . . . . .	20.0 mm
Models from March 1991 . . . . .	24.0 mm
Maximum disc run-out . . . . .	0.05 mm
Maximum surface distortion . . . . .	0.01 mm
Minimum disc pad friction material thickness (not including backing plate) . . . . .	3.0 mm



## Rear brakes

Type .....	Disc, with twin piston fixed calipers
Disc diameter:	
Hatchback models .....	224.0 mm
Estate models .....	251.0 mm
Disc thickness:	
New:	
Hatchback models .....	9.0 mm
Estate models .....	12.0 mm
Minimum thickness:	
Hatchback models .....	7.0 mm
Estate models .....	10.0 mm
Maximum disc run-out .....	0.05 mm
Maximum surface distortion .....	0.01 mm
Minimum disc pad friction material thickness (not including backing plate) .....	2.0 mm

## Torque wrench settings

	Nm	lbf ft
Front caliper bracket bolts .....	105	77
Rear caliper securing bolts:		
Hatchback models .....	45	33
Estate models .....	70	52
Brake control valve securing bolts .....	20	15
Parking brake cable adjuster locknuts .....	20	15
ABS wheel sensor securing bolt .....	10	7
ABS wheel sensor clamp bolt .....	3	2

## 1 General information and precautions

### General information

The dual circuit hydraulic system, with disc brakes fitted to all four wheels, is hydraulically operated from the main hydraulic system (see Chapter 9) via the brake control valve, which replaces the master cylinder found in a conventional braking system.

The hydraulic pressure to the front brakes is supplied directly from the main system (via the pressure regulator), but the pressure to the rear brakes is supplied from the rear suspension system. This arrangement favours the front brakes, and imposes a braking effort limitation on the rear axle in relation to the load on the suspension.

The brake pedal acts on the brake control valve.

The front brake calipers are of single piston floating type, operating on ventilated discs.

The rear brake calipers are of twin piston fixed type, operating on solid discs.

The mechanical parking brake mechanism is operated by a foot pedal and a lever on the fascia, and acts on the front calipers via flexible cables.

An anti-lock braking system (ABS) is fitted as standard on certain models, and is available as an option on others. The system is described in more detail in Section 15.

### Precautions



**Warning:** The fluid used in the XM hydraulic system is LHM mineral fluid, which is green in colour. The use of any other

**type of fluid will damage the system rubber seals and hoses. Keep the fluid carefully sealed in its original container.**

In an *emergency*, SAE 10 or SAE 20 engine oil (no other type of fluid) may be used in the system, but in this case the complete hydraulic system **must** be drained, and fresh LHM fluid substituted at the earliest opportunity.

If there is any possibility of fluid other than genuine LHM fluid being in the system, drain the complete hydraulic system, as described in Chapter 9, and fill it with the special rinsing solution obtainable from Citroën dealers. Bleed the system and leave the solution in the circuit for approximately 600 miles (1000 km), then drain it out and fill with LHM fluid. If the rubber seals are damaged by the incorrect fluid, it will also be necessary to renew these items at the same time (it is wise to entrust this task to a Citroën dealer).

Use only genuine spare parts. Components are identified by their white or green colour, and are of a special quality for use with LHM fluid.

Cleanliness is of the utmost importance when working on the hydraulic system and its components. Clean all adjacent areas before disconnecting components. After removal, blank off all orifices, and ensure that components, pipes and hoses do not get contaminated.

## 2 Brake hydraulic system - bleeding

**Note:** Refer to the precautions at the end of Section 1 before proceeding.

**1** The brake hydraulic system must be bled after renewing and refitting any components, brake pipe or hose. If this procedure is not carried out, air will be trapped in the hydraulic circuit, and the brakes will not function correctly.

**2** Before starting work, check all the brake lines, unions, hoses and connections for possible leakage.

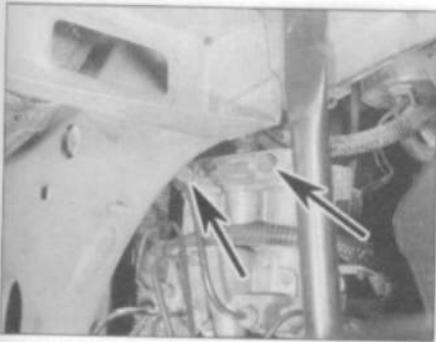
**3** If there is any possibility of fluid other than genuine LHM fluid being in the system, drain the complete hydraulic system, as described in Chapter 9, and fill it with the special rinsing solution obtainable from Citroën dealers. Bleed the system and leave the solution in the circuit for approximately 600 miles (1000 km), then drain it out and fill with LHM fluid. If the rubber seals are damaged by the incorrect fluid, it will also be necessary to renew these items at the same time.

**4** The brake bleeding procedure for the front and rear brakes differs. Proceed as follows.

**5** With the engine running, operate the suspension several times, switching between the 'Low' and 'Maximum' height positions.

**6** Set the height control to the 'Maximum' height position, then switch off the ignition.

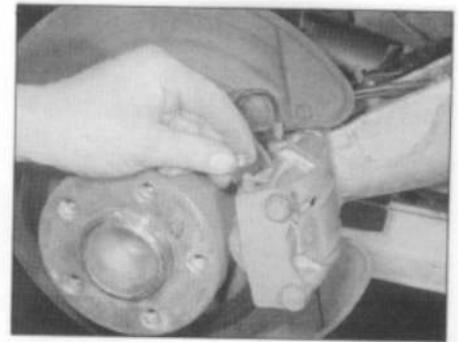
**7** Jack up the vehicle and support on axle stands with all four wheels clear of the ground (see *Jacking and Vehicle Support*). Remove the roadwheels.



2.8 ABS hydraulic valve block bleed screws (arrowed)



2.13a Front brake caliper bleed screw location (arrowed)



2.13b Removing the dust cap from a rear caliper bleed screw

8 On models with ABS, proceed as follows (see illustration).

- Working under the front left-hand wheel arch, remove the wheel arch liner for access to the ABS hydraulic valve block.
- Start the engine and allow it to run at idle speed.
- Slacken the bleed screws on the valve block using a spanner.
- Depress the brake pedal *slightly*, which will allow the hydraulic fluid to flow through the valve block return circuit. Keep the pedal depressed for a few seconds, then release it.
- Tighten the bleed screws on the valve block.

9 If not already done, start the engine, and allow it to run at idle speed.

10 If the system has been only partially disconnected, and suitable precautions were taken to minimise fluid loss, it should be necessary only to bleed that part of the system. If the complete system is being bled, bleed the brakes in the following order.

- Right-hand rear.
- Left-hand rear.
- Right-hand front.
- Left-hand front.

11 Collect a clean glass jar, a suitable length of plastic or rubber tubing, which is a tight fit over the bleed screw, and a ring spanner to fit the screw. The help of an assistant will also be required.

12 Check that the level in the hydraulic fluid reservoir is maintained at least above the 'MIN' mark (see Chapter 1A or 1B).

13 Remove the dust cap from the relevant caliper bleed screw, then fit the spanner and the tube to the screw (see illustrations). Place the other end of the tube in the jar.

14 Have the assistant depress the brake pedal *slightly*.

15 Loosen the bleed screw to allow fluid to flow into the jar. Continue until the fluid emerging is free from air bubbles.

16 When no more air bubbles appear, tighten the bleed screw securely, remove the tube and spanner, and refit the dust cap. Do not overtighten the bleed screw.

17 Where applicable, repeat the procedure

on the remaining screws in the sequence, until all air is removed from the system.

18 Stop the engine.

19 Where applicable, refit the mud shields, then refit the roadwheels, and lower the vehicle to the ground.

20 Check the hydraulic fluid level, and top up if necessary as described in Chapter 1A or 1B.

### 3 Hydraulic pipes and hoses – renewal

**Note:** Refer to the precautions at the end of Section 1 before proceeding.

1 If any pipe or hose is to be renewed, minimise fluid loss from the hoses using a proprietary brake hose clamp; metal brake pipe unions can be plugged (if care is taken not to allow dirt into the system) or capped immediately they are disconnected. Place a wad of rag under any union that is to be disconnected, to catch any spilt fluid.

2 If a flexible hose is to be disconnected, unscrew the brake pipe union nut before removing the spring clip which secures the hose to its mounting bracket (see illustration).

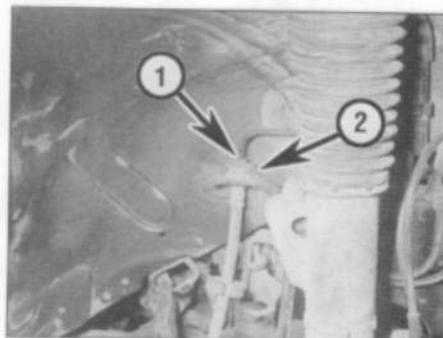
3 To unscrew the union nuts, it is preferable to obtain a brake pipe spanner of the correct size; these are available from most large motor accessory shops. Failing this, a close-

fitting open-ended spanner will be required, though if the nuts are tight or corroded, their flats may be rounded-off if the spanner slips. In such a case, a self-locking wrench is often the only way to unscrew a stubborn union, but it follows that the pipe and the damaged nuts must be renewed on reassembly. Always clean a union and surrounding area before disconnecting it. If disconnecting a component with more than one union, make a careful note of the connections before disturbing any of them.

4 If a brake pipe is to be renewed, it can be obtained, cut to length and with the union nuts and end flares in place, from Citroën dealers. All that is then necessary is to bend it to shape, following the line of the original, before fitting it to the car. Alternatively, most motor accessory shops can make up brake pipes from kits, but this requires very careful measurement of the original, to ensure that the replacement is of the correct length. The safest answer is usually to take the original to the shop as a pattern.

5 On refitting, do not overtighten the union nuts. It is not necessary to exercise brute force to obtain a sound joint.

6 Ensure that the pipes and hoses are correctly routed, with no kinks, and that they are secured in the clips or brackets provided. After fitting, remember to remove the brake hose clamps and bleed the hydraulic system as described in Section 2. Wash off any spilt fluid, and check carefully for fluid leaks.



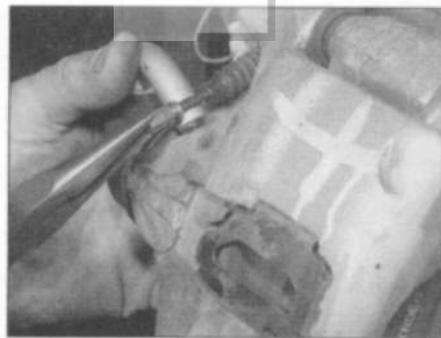
3.2 Brake pipe union nut (1) and spring clip (2)

### 4 Front brake pads – renewal

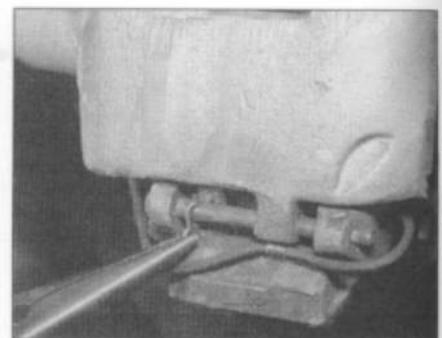
**Warning:** Renew both sets of front brake pads at the same time - never renew the pads on only one wheel, as uneven braking may result. Note that the dust created by wear of the pads may contain asbestos, which is a health hazard. Never blow it out with compressed air, and don't inhale any of it. An approved filtering mask



4.2 Disconnecting the brake pad wear sensor wiring connectors



4.3 Disconnecting the parking brake cable from the caliper



4.4a Extract the spring clip . . .

*should be worn when working on the brakes. DO NOT use petrol or petroleum-based solvents to clean brake parts; use brake cleaner or methylated spirit only.*

1 Chock the rear wheels, then jack up the front of the vehicle and support securely on axle stands (see *Jacking and Vehicle Support*). Remove the front roadwheels.

2 Disconnect the pad wear sensor wiring connectors (see illustration).

3 Disconnect the cable end from the parking brake operating lever. Pull the cable outer from the lug on the caliper, and move the cable to one side, clear of the caliper (see illustration).

4 Using pliers, extract the small spring clip from the caliper retaining pin, then slide the retaining pin from the caliper. If necessary,

carefully tap the pin free using a suitable pin-punch (see illustrations).

5 Release the pad wear sensor wiring from the clip at the bottom of the caliper (see illustration). Take care not to lose the clip.

6 Swivel the caliper upwards, taking care not to strain the fluid hose (see illustration).

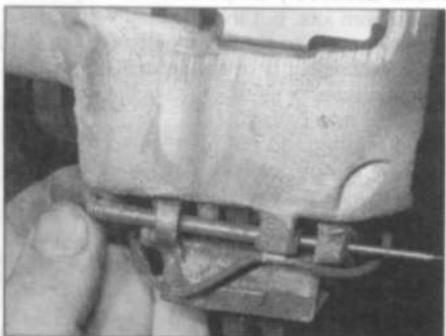
7 Withdraw the pads from the caliper (see illustration). Note how the lug on the inboard pad locates into the notch in the caliper piston.

8 First measure the thickness of each brake pad's friction material. If either pad is worn at any point to the specified minimum thickness or less, all four pads must be renewed (see illustration). Also, the pads should be renewed if any are fouled with oil or grease; there is no satisfactory way of degreasing

friction material, once contaminated. If any of the brake pads are worn unevenly, or are fouled with oil or grease, trace and rectify the cause before reassembly. New brake pads and retaining pin kits are available from Citroën dealers.

9 If the brake pads are still serviceable, carefully clean them using a clean, fine wire brush or similar, paying particular attention to the sides and back of the metal backing. Pick out any large embedded particles of dirt or debris. Carefully clean the pad locations in the caliper body/mounting bracket.

10 Prior to fitting the pads, check that the guide pin is free to slide easily in the caliper body/mounting bracket, and check that the rubber guide pin gaiter is undamaged (see illustration). Brush the dust and dirt from the



4.4b . . . then remove the caliper retaining pin



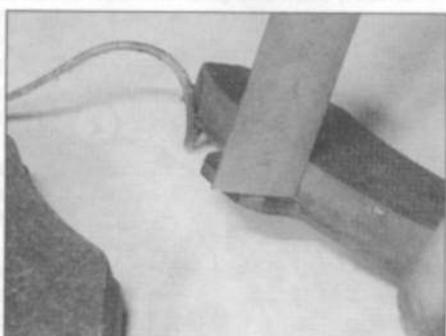
4.5 Release the pad wear sensor wiring from the clip . . .



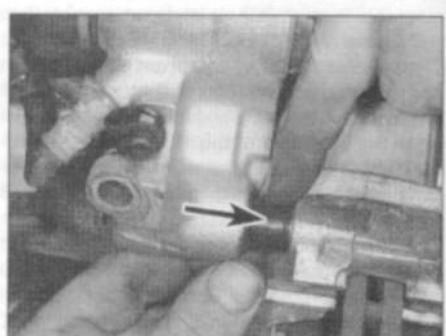
4.6 . . . and swivel the caliper upwards



4.7 Withdrawing the brake pads from the caliper



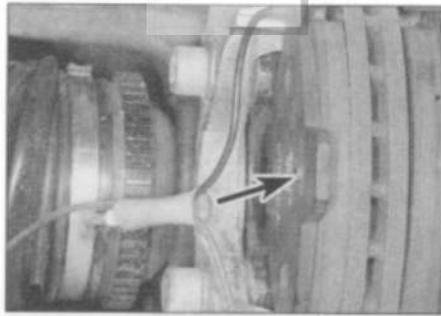
4.8 Measuring the thickness of a front brake pad



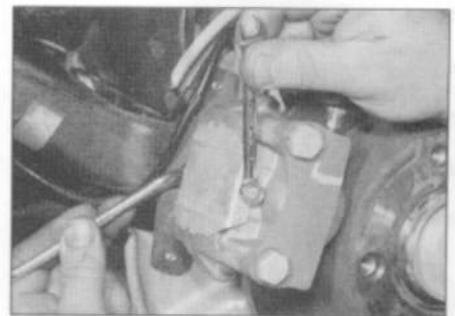
4.10 Check the condition of the guide pin gaiter (arrowed)



4.11 Using a length of flat bar to retract the caliper piston



4.12 Make sure that the locating lug (arrowed) engages with one of the piston notches



5.2a Counterhold the pad retaining pin, and unscrew the nut from the end of the pin...

caliper and piston, but *do not* inhale it, as it is injurious to health. Inspect the dust seal around the piston for damage, and the piston for evidence of fluid leaks, corrosion or damage. If attention to any of these components is necessary, refer to Section 7.

11 If new pads are to be fitted, the caliper piston must be pushed back into the cylinder to make room for them. In order to retract the piston, the piston must be turned clockwise as it is pushed into the cylinder. Citroën tool 9011-T is designed for this purpose, but a short length of flat bar or any similar tool can be used instead (see illustration). Push the piston fully into the cylinder bore. **Note:** Rotate the piston so that one of the notches in the piston is opposite the opening in the front of the caliper.

12 If new pads are being fitted, where applicable, remove the protective paper from the pad backing plates. Fit the pads, ensuring that the friction material is against the brake disc. Make sure that the locating lug on the inboard pad engages with one of the notches in the piston (see illustration).

13 Move the caliper into position over the brake disc.

14 Route the pad wear sensor wiring through the clip at the bottom of the caliper, then reconnect the sensor wiring connectors.

15 Slide the caliper retaining pin into position in the caliper bracket/body, with the hole for the spring clip at the inner end of the pin, then fit the spring clip.

16 Slide the parking brake cable into position in the caliper, then reconnect the end of

the cable to the operating lever on the caliper.

17 Repeat the procedure on the remaining front brake caliper.

18 Depress the brake pedal several times to operate the automatic wear adjustment mechanism in the calipers. Release the brake pedal, and check the parking brake adjustment as described in Section 11.

19 Make a final check on the operation of the brake calipers and the parking brake, then refit the roadwheels and lower the vehicle to the ground.

20 Check the hydraulic fluid level as described in "Weekly checks".

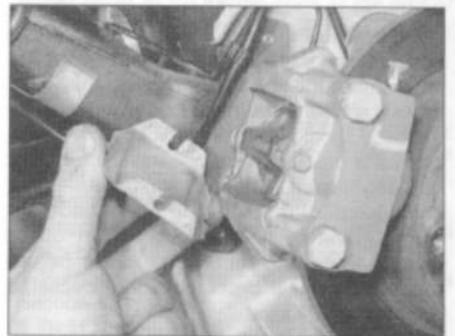
21 New pads will not give full braking efficiency until they have bedded in. Be prepared for this, and avoid hard braking as far as possible for the first few hundred miles or so after pad renewal.

## 5 Rear brake pads – renewal



**Warning:** Renew both sets of rear brake pads at the same time - never renew the pads on only one wheel, as uneven

braking may result. Note that the dust created by wear of the pads may contain asbestos, which is a health hazard. Never blow it out with compressed air, and don't inhale any of it. An approved filtering mask should be worn when working on the



5.2b ... then withdraw the pad shield

**brakes. DO NOT use petrol or petroleum-based solvents to clean brake parts; use brake cleaner or methylated spirit only.**

1 Apply the parking brake and chock the front wheels, then jack up the rear of the vehicle and support securely on axle stands (see *Jacking and Vehicle Support*). Remove the rear roadwheels.

2 Working at the inboard end of the caliper, unscrew the securing nut from the end of the pad retaining pin, then withdraw the pad shield (see illustrations).

3 Slide the pad retaining pin from the outboard end of the caliper, then lift out the anti-rattle spring, noting how the spring locates over the pads and caliper (see illustrations).

4 Slide the pads from the caliper, noting the locations and orientation of the shims, where applicable (shims are not fitted to all models) (see illustration).



5.3a Slide out the pad retaining pin...



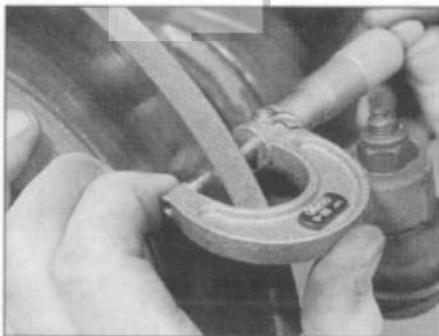
5.3b ... and lift out the anti-rattle spring



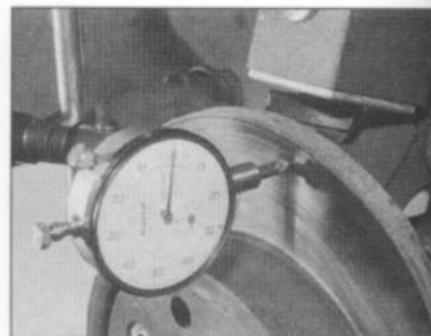
5.4 Sliding the inboard pad from the caliper



**5.11** View of caliper showing anti-rattle spring and pad retaining pin correctly fitted



**6.3** Using a micrometer to measure disc thickness



**6.4** Checking disc run-out using a dial gauge

**5** First measure the thickness of each brake pad's friction material. If either pad is worn at any point to the specified minimum thickness or less, all four pads must be renewed. Also, the pads should be renewed if any are fouled with oil or grease; there is no satisfactory way of degreasing friction material, once contaminated. If any of the brake pads are worn unevenly, or are fouled with oil or grease, trace and rectify the cause before reassembly. New brake pads are available from Citroën dealers.

**6** If the brake pads are still serviceable, carefully clean them using a clean, fine wire brush or similar, paying particular attention to the sides and back of the metal backing. Pick out any large embedded particles of dirt or debris. Carefully clean the pad locations in the caliper body/mounting bracket.

**7** Clean the end of each piston with petrol, then dry the pistons, and pour a few drops of fresh LHM fluid onto the end of each piston.

**8** If new brake pads are to be fitted, proceed as follows.

- Refit the old brake pads, and slide the pad retaining pin into position.
- Push each brake pad away from the disc, in order to push the pistons fully into their cylinder bores.
- Remove the retaining pin and the pads, and again clean the pad locations in the caliper.

**9** Fit the (new, where applicable) pads into position in the caliper. Make sure that the friction material is against the brake disc. Where applicable, make sure that the shims are fitted as noted before removal.

**10** Fit the anti-rattle spring, ensuring that it is located correctly over the pads and caliper, as noted before removal.

**11** Fit the pad retaining pin, ensuring that it passes in front of the anti-rattle spring, and the securing nut, but do not tighten the nut at this stage (see illustration).

**12** Refit the pad shield, then tighten the retaining pin securing nut.

**13** Repeat the procedure on the remaining rear brake caliper.

**14** Refit the roadwheels and lower the vehicle to the ground.

**15** With the engine running, depress the

brake pedal several times to bring the pads into contact with the discs.

**16** Check the hydraulic fluid level as described in "Weekly checks".

**17** New pads will not give full braking efficiency until they have bedded in. Be prepared for this, and avoid hard braking as far as possible for the first few hundred miles or so after pad renewal.

## 6 Brake discs - inspection, removal and refitting

### Front brake disc

#### Inspection



**Warning:** If either front disc requires renewal, BOTH should be renewed at the same time, to ensure even and consistent

braking. New brake pads should also be fitted. Note that the dust created by wear of the pads may contain asbestos, which is a health hazard. Never blow it out with compressed air, and don't inhale any of it. An approved filtering mask should be worn when working on the brakes. DO NOT use petrol or petroleum-based solvents to clean brake parts; use brake cleaner or methylated spirit only.

**1** Chock the rear wheels, then jack up the front of the car and support it on axle stands (see *Jacking and Vehicle Support*). Remove the appropriate front roadwheel.

**2** Slowly rotate the brake disc so that the full area of both sides can be checked; remove the brake pads if better access is required to the inboard surface (see Section 4). Light scoring is normal in the area swept by the brake pads, but if heavy scoring or cracks are found, the disc must be renewed.

**3** It is normal to find a lip of rust and brake dust around the disc's perimeter; this can be scraped off if required. If, however, a lip has formed due to excessive wear of the brake pad swept area, then the disc's thickness must be measured using a micrometer (see illustration). Take measurements at several places around the disc, at the inside and

outside of the pad swept area; if the disc has worn at any point to the specified minimum thickness or less, the disc must be renewed.

**4** If the disc is thought to be warped, it can be checked for run-out. Either use a dial gauge mounted on any convenient fixed point, while the disc is slowly rotated, or use feeler gauges to measure (at several points all around the disc) the clearance between the disc and a fixed point, such as the caliper mounting bracket (see illustration). If the measurements obtained are at the specified maximum or beyond, the disc is excessively warped, and must be renewed; however, it is worth checking first that the hub bearing is in good condition (Chapters 1A, section 7 or 1B, section 6 and/or Chapter 11). Also try the effect of removing the disc and turning it through 180°, to reposition it on the hub; if the run-out is still excessive, the disc must be renewed.

**5** Check the disc for cracks, especially around the wheel bolt holes, and any other wear or damage, and renew if necessary.

#### Removal

**6** Remove the front brake pads as described in Section 4.

**7** Unscrew the two bolts securing the caliper bracket to the hub carrier, and move the caliper to one side, taking care not to strain the fluid hose. Suspend the caliper to one side using wire or string. Do not remove the caliper from the guide pin.

**8** Unscrew the two brake disc securing screws, then withdraw the disc from the hub.

#### Refitting

**9** Ensure that the mating faces of the disc and the hub are absolutely clean, then fit the disc to the hub. Refit and tighten the disc securing screws.

**10** Refit the caliper, and tighten the bracket securing bolts to the specified torque.

**11** Refit the brake pads as described in Section 4.

### Rear brake disc

#### Inspection



**Warning:** If either rear disc requires renewal, BOTH should be renewed at the same time, to ensure even and consistent

braking. New brake pads should also be fitted. Note that the dust created by wear of the pads may contain asbestos, which is a health hazard. Never blow it out with compressed air, and don't inhale any of it. An approved filtering mask should be worn when working on the brakes. DO NOT use petrol or petroleum-based solvents to clean brake parts; use brake cleaner or methylated spirit only.

12 Apply the parking brake and chock the front wheels, then jack up the rear of the car and support securely on axle stands (see *Jacking and Vehicle Support*).

13 Proceed as described for the front brake disc in paragraphs 2 to 5, but refer to Section 5 if the brake pads are to be removed.

#### Removal

14 Jack up the vehicle and support securely on axle stands with the wheels clear of the ground (see *Jacking and Vehicle Support*).

15 Remove the relevant roadwheel.

16 Depressurise the hydraulic system as described in Chapter 9.

17 Remove the brake pads as described in Section 5.

18 Refit the pad retaining pin to the caliper, then refit and tighten the pin securing nut to hold the two halves of the caliper together.

19 Unscrew the two bolts securing the brake caliper to the trailing arm.

20 Move the caliper clear of the disc, taking care not to strain the fluid pipe. Suspend the caliper using wire or string - if desired, the caliper can be temporarily secured using the upper securing bolt once the disc has been removed.

21 Remove the disc securing screw, then withdraw the disc from the hub.

#### Refitting

22 Where applicable, remove the upper caliper securing bolt, and again move the caliper to one side to facilitate refitting of the disc.

23 Ensure that the mating faces of the disc and the hub are absolutely clean, then fit the disc to the hub. Refit and tighten the disc securing screw.

24 Lubricate the threads and heads of the

caliper securing bolts, then refit the caliper, and tighten the bolts to the specified torque.

25 Unscrew the securing nut, and remove the pad retaining pin from the caliper.

26 Refit the brake pads as described in Section 5.

27 Refit the roadwheel.

28 Pressurise the hydraulic system as described in Chapter 9.

29 Lower the vehicle to the ground.

### 7 Front brake caliper - removal, overhaul and refitting

**Note:** Refer to the precautions at the end of Section 1 before proceeding.

#### Removal

1 Remove the brake pads as described in Section 4.

2 Place a suitable container under the fluid hose union on the caliper, to catch any escaping hydraulic fluid. Unscrew the union and disconnect the hose from the caliper. Plug the open ends of the hose and caliper to prevent dirt ingress and further fluid loss.

3 Remove the two securing bolts, and withdraw the caliper/bracket assembly from the hub carrier (see illustrations).

#### Overhaul

4 The caliper can be overhauled after obtaining the relevant repair kit from a Citroën dealer, however is strongly recommended that overhaul is entrusted to a Citroën dealer, as various special tools are required to fully dismantle the caliper. If the caliper is to be overhauled, note the following points.

- Ensure that the correct repair kit is obtained for the caliper being worked on.
- Note the locations of all components to ensure correct refitting.
- Lubricate the new seals using LHM.
- Follow the assembly instructions supplied with the repair kit.

#### Refitting

5 Offer the caliper/bracket assembly into

position, then refit the securing bolts and tighten to the specified torque.

6 Reconnect the fluid hose, and tighten the union.

7 Refit the brake pads as described in Section 4.

8 Bleed the brake hydraulic system as described in Section 2.

9 Refit the roadwheels and lower the vehicle to the ground.

### 8 Rear brake caliper - removal, overhaul and refitting

**Note:** Refer to the precautions at the end of Section 1 before proceeding. A new fluid pipe seal will be required on refitting.

#### Removal

1 Jack up the vehicle and support securely on axle stands with the wheels clear of the ground (see *Jacking and Vehicle Support*).

2 Remove the relevant roadwheel.

3 Depressurise the hydraulic system as described in Chapter 9.

4 Remove the brake pads as described in Section 5.

5 Refit the pad retaining pin to the caliper, then refit and tighten the pin securing nut to hold the two halves of the caliper together.

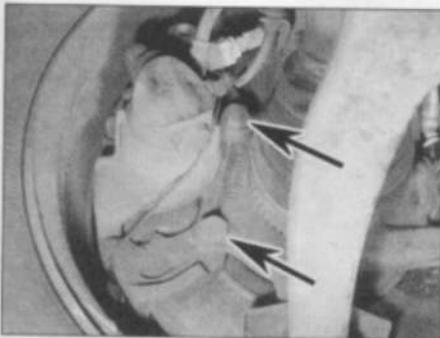
6 Place a suitable container under the fluid pipe union on the caliper, to catch any escaping hydraulic fluid. Unscrew the union and disconnect the pipe from the caliper. Plug the open ends of the pipe and caliper to prevent dirt ingress and further fluid loss.

7 Unscrew the two securing bolts, and withdraw the caliper (see illustration).

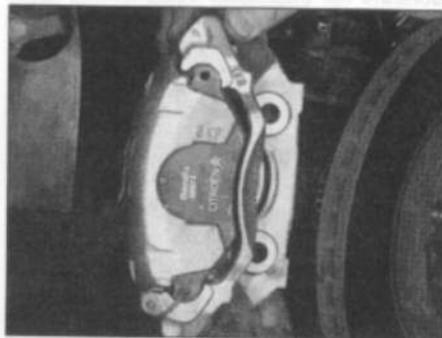
#### Overhaul

8 The caliper can be overhauled after obtaining the relevant repair kit from a Citroën dealer, bearing in mind the following points.

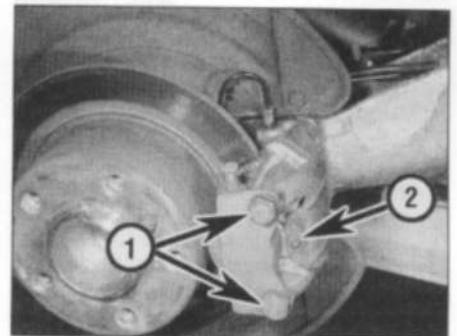
- Do not separate the two halves of the caliper.
- Ensure that the correct repair kit is obtained for the caliper being worked on.
- Note the locations of all components to ensure correct refitting.



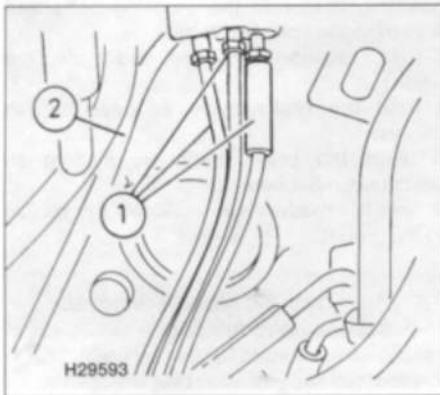
7.3a Remove the two securing bolts (arrowed) . . .



7.3b . . . and withdraw the caliper



8.7 Rear caliper securing bolts (1). Note that the pad retaining pin (2) must be refitted before removing the caliper



9.6 Disconnect the three fluid pipes (1) and the fluid return hose (2) from the brake control valve/compensator – left-hand-drive models

- d) Lubricate the new seals using LHM.  
e) Follow the assembly instructions supplied with the repair kit.

### Refitting

- 9 Lubricate the threads of the caliper securing bolts, then refit the caliper, and tighten the bolts to the specified torque.
- 10 Reconnect the fluid pipe to the caliper, using a new seal, and tighten the union.
- 11 Tighten the securing nut, and refit the pad retaining pin from the caliper.
- 12 Refit the brake pads as described in Section 5.
- 13 Refit the roadwheel.
- 14 Pressurise the hydraulic system as described in Chapter 9.
- 15 Lower the vehicle to the ground.

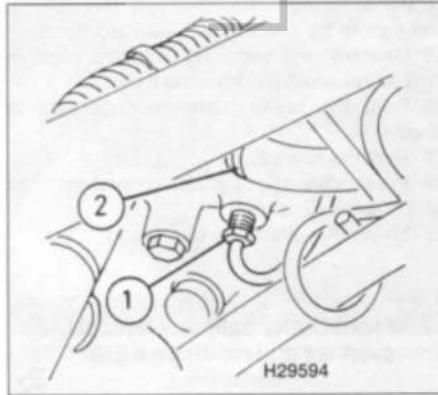
### 9 Brake control valve/compensator – removal, overhaul and refitting

**Note:** Refer to the precautions given at the end of Section 1 before proceeding. New hose clips, and new fluid pipe seals will be required on refitting.

#### Left-hand-drive models

##### Removal

- 1 Chock the rear wheels, then jack up the front of the car and support it on axle stands (see *Jacking and Vehicle Support*). Remove the left-hand front roadwheel, then remove the mud shield from under the wheel arch.
- 2 Depressurise the hydraulic system as described in Chapter 9.
- 3 Using a screwdriver, release the securing clip, and remove the cover from the battery, then disconnect the battery negative lead.
- 4 Remove the air cleaner assembly as described in Chapter 4A or 4B.
- 5 Remove the hydraulic fluid reservoir as described in Chapter 9.
- 6 Unscrew the unions, and disconnect the



9.7 Slacken the remaining pipe union (1) and the remaining fluid return hose clip (2) – left-hand-drive models

three fluid pipes shown from the valve. Also disconnect the fluid return hose (see illustration). Note the locations of the pipes and hose to aid refitting. Be prepared for fluid spillage, and plug the open ends of the pipes, hose and valve to prevent dirt entry and further fluid loss.

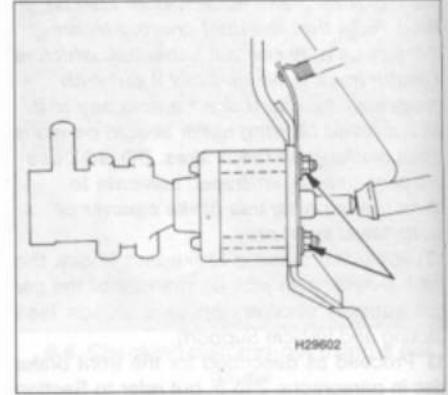
- 7 Slacken the union securing the remaining fluid pipe, and the clip securing the remaining fluid return hose (see illustration).
- 8 Unscrew the two brake control valve/compensator securing nuts, and unclip the clamp from the top of the valve/compensator (see illustration).
- 9 Carefully lift the valve/compensator from the bulkhead, and recover the spacer and seal.
- 10 Disconnect the remaining fluid pipe and return hose, and withdraw the assembly from the engine compartment. Again, note the locations of the pipe and hose to aid refitting. Be prepared for fluid spillage, and plug the open ends of the pipe, hose and valve to prevent dirt entry and further fluid loss.

##### Overhaul

11 The valve/compensator can be overhauled after obtaining the relevant repair kit from a Citroën dealer. Note the locations of all components to ensure correct refitting, and lubricate the new seals using LHM. Follow the assembly instructions supplied with the repair kit.

##### Refitting

- 12 Refitting is a reversal of removal, bearing in mind the following points.
- a) Make sure that the spacer and seal are in place when refitting the valve/compensator assembly. Examine the seal, and renew if necessary.
  - b) Use new seals when reconnecting the fluid pipes.
  - c) Ensure that the fluid pipes and hoses are correctly reconnected as noted before removal.
  - d) Tighten the valve/compensator securing nuts to the specified torque.



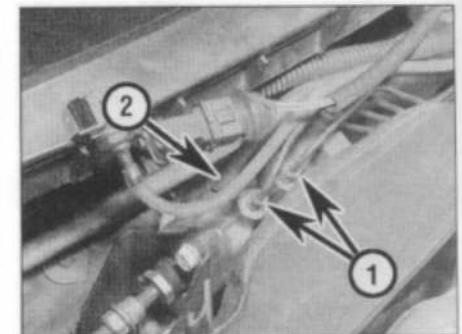
9.8 Brake control valve/compensator securing nuts (arrowed) – left-hand-drive models

- e) Refit the hydraulic fluid reservoir as described in Chapter 9.  
f) On completion, pressurise the hydraulic system as described in Chapter 9, and bleed the brake hydraulic circuit as described in Section 2.

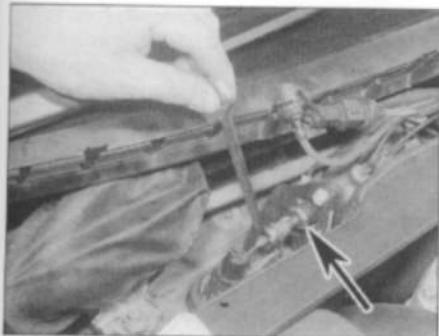
#### Right-hand-drive models

##### Removal

- 13 Depressurise the hydraulic system as described in Chapter 9.
- 14 Remove the front scuttle trim panel as described in Chapter 12.
- 15 Unclip both bonnet support struts, and move the bonnet to its fully-raised position. Ensure that the bonnet is held securely in position (using a wooden prop or similar).
- 16 Disconnect the windscreen wiper motor wiring plug. If desired, to improve access, remove the windscreen wiper motor as described in Chapter 13.
- 17 Slacken the four unions securing the fluid pipes to the valve/compensator.
- 18 Disconnect the fluid return hose from the top of the valve. Note the location of the hose to aid refitting (see illustration). Be prepared for fluid spillage, and plug the open ends of the hose and valve to prevent dirt entry and further fluid loss.



9.18 Brake control valve/compensator top fluid pipe connections (1) and fluid return hose (2) – right-hand-drive models



9.19 Slacken the locknut, and screw the pedal adjustment stop (arrowed) in as far as possible – right-hand-drive models

19 Slacken the locknut, and screw brake pedal adjustment stop in as far as possible (see illustration).

20 Unscrew the two valve/compensator securing bolts (see illustration).

21 Disconnect the four fluid pipes from the valve/compensator. Note the locations of the pipes to aid refitting. Be prepared for fluid spillage, and plug the open ends of the pipes and valve to prevent dirt entry and further fluid loss.

22 Swivel the valve/compensator round through 180° for access to the fluid return hose at the bottom of the assembly.

23 Disconnect the remaining fluid return hose (again, be prepared for fluid spillage, and plug the valve/compensator and hose), and withdraw the valve/compensator from the scuttle.

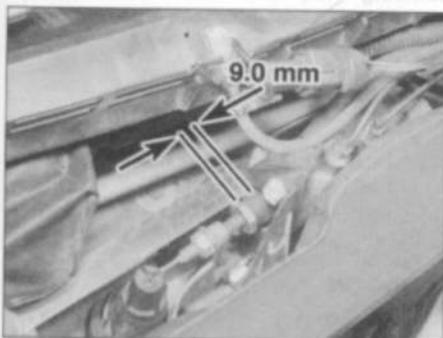
#### Overhaul

24 Refer to paragraph 11.

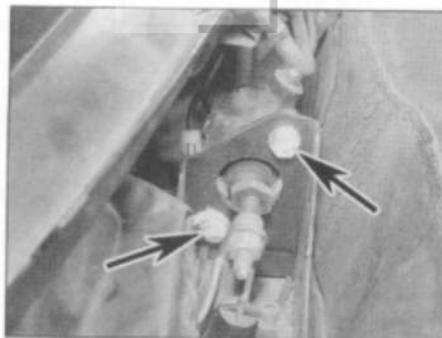
#### Refitting

25 Refitting is a reversal of removal, bearing in mind the following points.

- Use new seals when reconnecting the fluid pipes.
- Ensure that the fluid pipes and hoses are correctly reconnected as noted before removal.
- Tighten the valve/compensator securing nuts to the specified torque.



10.3 Measure the distance between the end face of the brake control valve/compensator mounting bracket and the brake pedal stop



9.20 Unscrew the two valve/compensator securing bolts (arrowed) – right-hand-drive models

- Adjust the brake pedal adjustment stop to give the specified brake pedal height (see Section 10), then tighten the locknut.
- Refit the front scuttle trim panel with reference to Chapter 12.
- On completion, pressurise the hydraulic system as described in Chapter 9, and bleed the brake hydraulic circuit as described in Section 2.

## 10 Brake pedal – adjustment

### Left-hand-drive models

1 No adjustment of the brake pedal is possible.

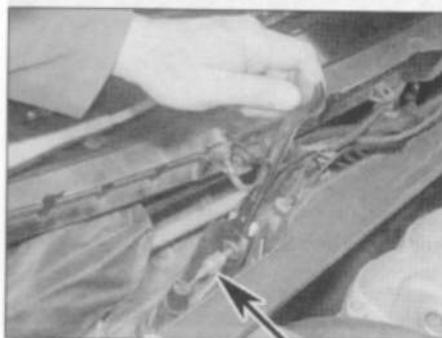
### Right-hand-drive models

2 Remove the front scuttle trim panel as described in Chapter 12.

3 With the brake pedal in the rest position, measure the distance between the end face of the brake control valve/compensator mounting bracket and the brake pedal stop. The distance should be 9.0 mm (see illustration).

4 If adjustment is required, slacken the brake pedal adjustment stop locknut, and turn the stop as necessary to give the specified distance (see illustration). Tighten the locknut when adjustment is complete.

5 On completion, refit the front scuttle trim panel with reference to Chapter 12.



10.4 Slacken the locknut (arrowed) and turn the stop to give the specified distance

## 11 Parking brake – adjustment

### Automatic wear adjustment

1 The front brake calipers incorporate an automatic adjustment mechanism, which compensates for the clearance in the parking brake operating mechanism created by brake pad wear. The adjustment mechanism is operated by hydraulic pressure as the brakes are applied.

2 The following operation should be carried out if the front brake pads have been removed, or if work has been carried out on the front calipers, in order to initially set the adjustment mechanism.

3 Start the engine, and allow it to run at idle.

4 Ensure that the parking brake lever is in the 'released' position.

5 Depress the brake pedal several times to operate the adjustment mechanism.

6 Release the brake pedal, and check that the parking brake can be fully applied by depressing the parking brake pedal between 4 to 12 clicks. Stop the engine. If necessary, adjust the parking brake cables as described in the following paragraphs.

### Cable adjustment

7 Chock the rear wheels, then jack up the front of the car and support it on axle stands (see *Jacking and Vehicle Support*). Remove the front roadwheels.

8 Fully release the parking brake.

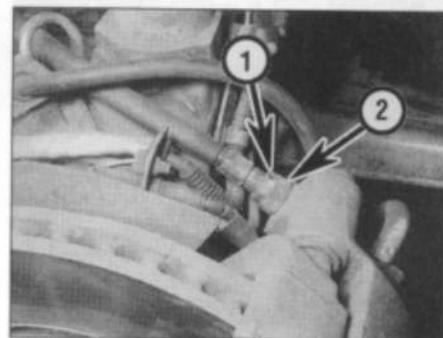
9 Depress the brake pedal to bring the brake pads into contact with the disc, then release the pedal.

10 Push in the parking brake lever on the fascia to the 'locked' position.

11 Depress the parking brake pedal to the 4th notch of its travel.

12 Working on one of the calipers, loosen the cable adjuster locknut at the caliper, then turn the adjuster nut to obtain a balance between the cable lengths at the equaliser to within 1.5 mm (see illustration).

13 If necessary, repeat the procedure on the remaining caliper.



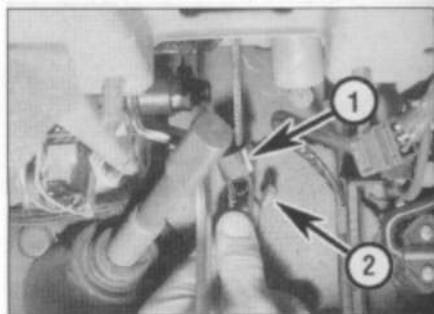
11.12 Parking brake cable adjuster locknut (1) and adjuster nut (2)



12.3 Removing the parking brake cable equaliser cover – right-hand-drive model



12.4 Unhook the end of the cable (arrowed) from the equaliser – right-hand-drive model



12.6 Slide off the plastic cover (1), then unhook the end of the parking brake cable (2) from the lever – viewed with steering column removed for clarity

14 Pull the parking brake lever on the facia to the 'released' position. The parking brake pedal should return to its rest position.

15 With the caliper parking brake operating levers at rest (parking brake released), the levers should not be pulled by the cables whatever the steering lock angle and the ride height of the vehicle. Check this, and re-adjust if necessary.

16 Tighten the cable adjuster locknuts.

17 Depress the parking brake pedal several times, and make sure that it returns to its rest position.

18 Operate the parking brake mechanism several times, and check that the parking brake can be fully applied by depressing the pedal between 6 to 12 clicks.

## 12 Parking brake cables - removal and refitting



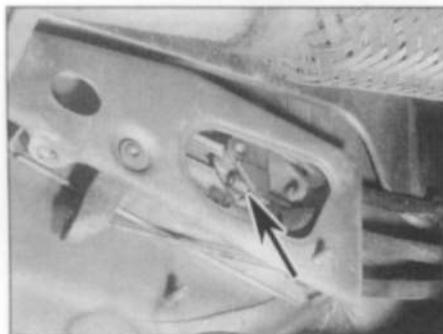
### Pedal-to-equaliser cable

#### Removal

1 Jack up the vehicle and support securely on axle stands (see *Jacking and Vehicle Support*).

2 Fully release the parking brake.

3 Working under the vehicle, unbolt the parking brake cable equaliser cover plate (see illustration).



12.13 Unhook the end of the equaliser cable (arrowed) from the equaliser – right-hand-drive model

4 Unhook the end of the cable from the equaliser, then release the cable from the locating brackets under the vehicle, noting its routing (see illustration).

5 Working at the engine compartment bulkhead, unscrew the two nuts securing the parking brake cable plate to the bulkhead – access to these nuts is extremely difficult.

6 Working in the driver's footwell, slide the plastic cover from the end of the parking brake lever, then unhook the end of the cable from the lever (see illustration).

7 Working in the engine compartment, pull the cable through the bulkhead, then withdraw it from the engine compartment.

#### Refitting

8 Refitting is a reversal of removal, but ensure that the cable is routed as noted before removal and, on completion, check the parking brake adjustment as described in Section 11.

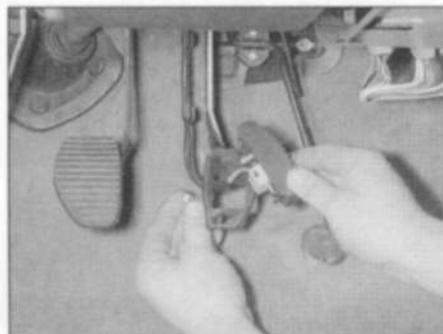
### Equaliser-to-caliper cable

#### Removal

9 Jack up the vehicle and support securely on axle stands (see *Jacking and Vehicle Support*). Remove the relevant front roadwheel.

10 Fully release the parking brake.

11 Disconnect the cable end from the parking brake operating lever. Pull the cable out from the lug on the caliper, and move the cable to one side, clear of the caliper.



13.6 Unscrew the securing nut and remove the pedal rubber/switch assembly

12 Working under the vehicle, unbolt the parking brake cable equaliser cover plate.

13 Unhook the end of the relevant cable from the equaliser, then release the cable from the locating brackets, and withdraw it from the vehicle (see illustration).

#### Refitting

14 Refitting is a reversal of removal but, on completion, check the parking brake adjustment as described in Section 11.

## 13 Stop-light switch - removal and refitting



### Removal

1 The switch is integral with the brake pedal rubber.

2 Using a screwdriver, release the securing clip, and remove the cover from the battery, then disconnect the battery negative lead.

3 Remove the securing clips and screws, and remove the driver's footwell carpet trim panel from the underside of the facia.

4 Trace the wiring up from the pedal, and separate the two halves of the stop light switch wiring connector.

5 Unclip the wiring from the pedal.

6 Working behind the pedal, unscrew the securing nut, then remove the pedal rubber/switch assembly (see illustration).

### Refitting

7 Refitting is a reversal of removal.

## 14 Parking brake 'on' warning light switch - removal and refitting



### Removal

1 The switch is mounted in the parking brake pedal mounting bracket in the driver's footwell.

2 Using a screwdriver, release the securing clip, and remove the cover from the battery, then disconnect the battery negative lead.

3 Pull back the footwell carpet trim panel for access to the switch.

4 Disconnect the wiring plugs from the switch.

5 Slacken the locknut, then unscrew the switch from the pedal bracket. Note the number of turns necessary to unscrew the switch, to aid refitting

### Refitting

6 Refitting is a reversal of removal, but screw the switch into the bracket by the number of turns noted before removal and, if necessary, adjust the position of the switch to achieve satisfactory operation. Tighten the locknut when adjustment is complete.

## 15 Anti-lock braking system (ABS) - general information

An anti-lock braking system is available as standard equipment on some models, and as an option on certain others.

To prevent wheel locking, the system provides pressure modulation in the braking circuits. To achieve this, sensors mounted each wheel monitor the rotational speeds of the wheels, and are able to detect when there is a risk of wheel locking (low rotational speed). Solenoid valves are positioned in the brake circuits to each wheel, and the solenoid valves are incorporated in a modulator assembly, which is controlled by an electronic control unit (ECU). The ECU controls modulation of the braking effort applied to each wheel, according to the information supplied by the wheel sensors.

Should a fault develop in the system, a self-diagnostic facility is incorporated in the ECU, which can be used in conjunction with special diagnostic equipment available to a Citroën dealer, to determine the nature of the fault.

The braking system components used on models with ABS are similar to those used on models with a conventional braking system.

## 16 Anti-lock braking system components - removal and refitting

### Hydraulic valve block

#### Removal

1 Depressurise the hydraulic system as described in Chapter 9.

2 Chock the rear wheels, then jack up the front of the vehicle and support securely on axle stands (see *Jacking and Vehicle Support*). Remove the left-hand front roadwheel.

3 Working under the front left-hand wheel arch, remove the wheel arch liner for access to the ABS hydraulic valve block.

4 Remove the air cleaner assembly as described in Chapter 4A or 4B.

5 Remove the battery, with reference to Chapter 5A if necessary.

6 Working around the battery tray, unbolt all electrical units, fuseboxes, etc, and move them to one side to allow the battery tray to be removed.

7 Release the wiring harnesses, hoses and cables, as applicable, from any clips and brackets attached to the battery tray. It may be necessary to disconnect certain wiring connectors, in which case note their locations.

8 Check that all relevant components have been moved clear, then unscrew the securing bolts and nuts, and remove the battery tray assembly. Note that on some models, the air intake trunking passes through the battery tray, and it will be necessary to disconnect the trunking to allow removal of the battery tray.

9 Move any remaining wiring harnesses, hoses and cables to one side (noting their routing to aid refitting) to provide adequate access to the ABS hydraulic valve block.

10 Disconnect the two wiring plugs from the side of the valve block, then release the wiring harnesses from the clips attached to the assembly.

11 Release the clip, and disconnect the hydraulic fluid return hose from the top of the valve block - be prepared for fluid spillage.

12 Unscrew the unions, and disconnect the hydraulic fluid pipes from the left-hand side of the valve block - note the locations of the pipes to ensure correct refitting. Again be prepared for fluid spillage, and position a container beneath the assembly to catch escaping fluid.

13 Unscrew the front and rear securing nuts, and the lower securing nut, and withdraw the valve block assembly from its mounting bracket (see illustrations).

#### Refitting

14 Refitting is a reversal of removal, bearing in mind the following points.

a) Ensure that the valve block fluid pipes are correctly reconnected as noted before removal.

b) Ensure that all wiring harnesses, hoses and cables are correctly routed and reconnected as noted before removal.

c) On completion, pressurise the hydraulic system as described in Chapter 9, then bleed the brake hydraulic system, as described in Section 2.

### Front wheel sensor

#### Removal

15 Using a screwdriver, release the securing clip, and remove the cover from the battery, then disconnect the battery negative lead.

16 Chock the rear wheels, then jack up the front of the vehicle, and support securely on axle stands (see *Jacking and Vehicle Support*). Remove the relevant roadwheel.

17 Trace the wiring back from the sensor, and separate the two halves of the connector. Note the routing of the wiring to aid correct refitting.

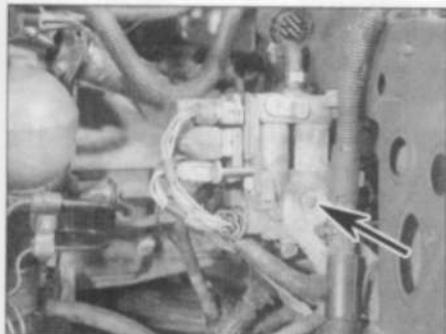
18 Where applicable, unclip the wiring from the brackets and/or clips.

19 Unscrew the sensor clamp screw, and the sensor securing bolt, and slide the sensor from the hub carrier (see illustration).

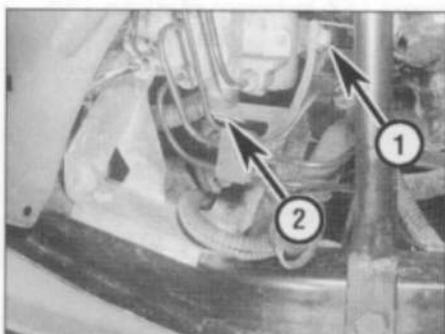
#### Refitting and adjustment

20 Ensure that the mating faces of the sensor and housing are clean, and lightly grease the sensor body.

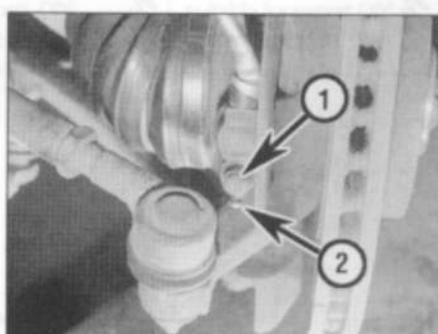
21 If a new sensor is being fitted, it will normally be supplied with a setting shim fitted to the end of the sensor to aid fitting.



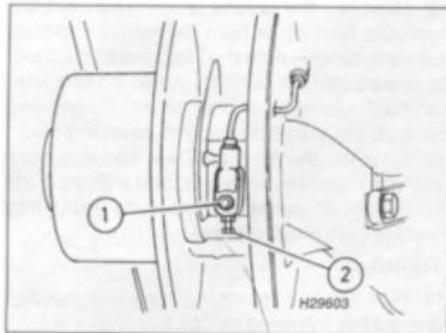
16.13a ABS hydraulic valve block front securing nut (arrowed) - viewed with body front panel removed



16.13b ABS hydraulic valve block rear (1) and lower (2) securing nuts - viewed through left-hand wheel arch



16.19 ABS front wheel sensor securing bolt (1) and clamp screw (2)



**16.34** ABS rear wheel sensor securing bolt (1) and clamp screw (2)

**22** Ensure that the sensor clamp screw in the hub carrier is loosened.

**23** Fit the sensor, together with its shim, where applicable, into the housing in the hub carrier.

**24** Screw in the sensor securing bolt, without tightening fully.

**25** If the sensor has a setting shim fitted, move the sensor until the setting shim contacts the toothed sensor wheel. Do not turn the hub during this procedure.

**26** If the sensor is not fitted with a setting shim, insert a 0.5 mm feeler gauge between the end of the sensor and the toothed sensor wheel, and adjust the position of the sensor until the feeler blade is a stiff sliding fit.

**27** Hold the sensor in position, then tighten the sensor securing bolt, followed by the clamp screw.

**28** Reconnect the sensor wiring connector, and clip the wiring into position, ensuring that it is routed as noted before removal.

**29** Refit the roadwheel, then lower the vehicle to the ground and reconnect the battery negative lead.

### Rear wheel sensor

#### Removal

**30** Using a screwdriver, release the securing clip, and remove the cover from the battery, then disconnect the battery negative lead.



**16.44** Unclip the cover from the control unit housing . . .

**31** Apply the parking brake and chock the front wheels, then jack up the front of the vehicle, and support securely on axle stands (see *Jacking and Vehicle Support*). Remove the relevant roadwheel.

**32** Trace the wiring back from the sensor, and separate the two halves of the connector. Note the routing of the wiring to aid correct refitting.

**33** Where applicable, unclip the wiring from the brackets and/or clips.

**34** Unscrew the sensor clamp screw, and the sensor securing bolt, and slide the sensor from the trailing arm (see illustration).

#### Refitting and adjustment

**35** Ensure that the sensor clamp screw and the sensor securing bolt are loose.

**36** Ensure that the mating faces of the sensor and the bore in the trailing arm are clean, and lightly grease the sensor body.

**37** Using a depth gauge inserted into the sensor bore in the trailing arm, measure the distance between the top of one of the sensor wheel teeth, and the upper surface of the sensor bore.

**38** Fit the sensor, and slide it into the bore to give a clearance between the upper surface of the sensor bore and the end of the sensor equal to the measurement taken in paragraph 37, less 0.5 mm. This can be achieved by measuring the distance from the end of the



**16.45** . . . then withdraw the ABS electronic control unit

sensor to the lower face of the flange at the top of the sensor, and calculating the appropriate clearance between the lower face of the flange on the sensor, and the upper surface of the sensor bore.

**39** Hold the sensor in position, then tighten the sensor securing bolt, followed by the clamp screw.

**40** Reconnect the sensor wiring connector, and clip the wiring into position, ensuring that it is routed as noted before removal.

**41** Refit the roadwheel, then lower the vehicle to the ground and reconnect the battery negative lead.

### Electronic control unit

#### Removal

**42** The Electronic control unit (ECU) is located in the control unit housing at the right-hand side of the engine compartment.

**43** Using a screwdriver, release the securing clip, and remove the cover from the battery, then disconnect the battery negative lead.

**44** Unclip the cover from the control unit housing (see illustration).

**45** Withdraw the ECU, then release the metal securing clip, and disconnect the wiring connector (see illustration).

#### Refitting

**46** Refitting is a reversal of removal.